IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Washio et al.
Appl. No.	:	10/561,802
Filed	:	December 22, 2005
For	:	DEVELOPER COMPOSITION FOR RESISTS AND METHOD FOR FORMATION OF RESIST PATTERN
Examiner	:	Le, Hoa Van
Group Art Unit	:	1752

PRE-APPEAL REQUEST FOR REVIEW

Dear Commissioner for Patents:

Applicants request pre-appeal review of the rejections under 35 U.S.C. §103(a) in the Office Action dated December 27, 2007. This request is being filed with a Notice of Appeal. The claims have been finally rejected so the filing of the present paper is proper. No amendments are being filed with this request. The review is requested for the following reasons:

The Examiner alleges that since the Sato et al. and Anzures et al. references are generally related to developers, it would have been obvious to use: 1) an alkali metal salt of a diphenyl oxide sulfonic group for reasonable expectation of obtaining the advantage of reducing residue in a developing solution and/or on a developing substrate as disclosed by Anzures et al; and 2) an organic quaternary ammonium for reasonable expectation of obtaining an alkaline solution to remove a soft portion of a later as disclosed by Sato et al. However, as explained below, the combination of these references, using either as a primary reference, would not lead one of ordinary skill in the art to the claimed invention. Accordingly, the claimed invention is not obvious over these references.

Metal-Containing Surfactants are undesirable for use in semiconductors

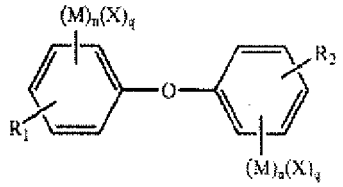
Sato et al. clearly teaches away from the claimed invention. This reference discloses a developer composition comprising an organic quaternary ammonium base and a specific ammonium salt of alkyl diphenyl ether sulfonic acid. It should be noted that Sato et. al. clearly teaches that a developer composition in the field of semiconductors contains **no metallic element** which contaminates the semiconductor devices. See Sato et al. at column 1, lines 24-29. In this section, Sato characterizes metallic elements as a "contaminant" which adversely influences performance of

the semiconductor devices being produced. As such, the use of metallic elements in combination with Sato's teachings would render these teachings unsatisfactory for its intended purpose of manufacturing semiconductor devices.

The two Tanaka et al. references cited by the Examiner as cumulative similarly teach away from the presently claimed invention. See, e.g. Tanaka 5,543,268 at Column 1, lines 48-57 and Column 3, lines 38-39 and Tanaka 6,329,126 at Column 1, lines 49-58 and Column 3, lines 36-37. Thus, in view of Sato et al. or either of the two Tanaka references, a person or ordinary skill in the art of semiconductors would not use an alkali metal salt of an alkyl diphenyl ether sulfonic acid as recited in the present claims because such salts are taught to be deleterious to the semiconductors produced using the metal-containing developer compositions.

Anzures et al. discloses a diphenyl oxide represented by the following formula (I):

(I)



Anzures teaches that in formula (I) above, X is preferably hydrogen, sodium, calcium, potassium or ammonium, and M is preferably $-SO_3^-$, $-PO_4^{3-}$ or $-PO_4(R')_2$ (see column 6, lines 42 to 44 of Anzures). Therefore, the diphenyl oxide represented by formula (I) above satisfies the requirements of the present invention only when M is $-SO_3^-$ and X is sodium, calcium or potassium.

A person skilled person in the art would not combine Anzures with Sato or vice versa, in view of the deleterious effects of metallic elements on semiconductors (contamination of semiconductor devices), a diphenyl oxide represented by formula (I) above wherein X is sodium, calcium or potassium would certainly not be chosen to include in the claimed developer composition. Rather, a diphenyl oxide in which X is a non-metal, i.e. hydrogen or ammonium, would be used. Such a diphenyl oxide might be regarded as being advantageous in view of the teachings of Sato et al. However, in view of the explicit teachings of the Sato et al. reference, one of ordinary skill in the art would not combine Anzures with Sato or vice versa, in a manner that the developer composition of the claimed invention would be obtained. Therefore, there is no *prima facie* case of obviousness over the combination of these references.

The Examiner dismisses these arguments, stating that "the instant claims have not been excluded a use of the claimed composition in a semiconductor industry as disclosed in the instant

specification on page 6, lines 3-4 with 'unlike the filed on the semiconductor' as urged." However, the Examiner has taken this statement out of context. The complete paragraph in which lines 3-4 are found states the following:

> However, since the portion with no resist pattern is metal-coated in the application where such a thick resist pattern is formed, unlike the field of the semiconductor that requires the ion implantation process, the residual metal such as sodium, potassium or calcium causes no problem even if present.

This section of the specification explains why the presence of a residual metal in the resist pattern of the present invention is acceptable, unlike in semiconductors using ion implantation in which the presence of metal ions is undesirable (as taught by Sato et al.). T hus, nothing in Applicants' specification suggests that the claimed "developer composition for resists" is useful in any field other than semiconductors. Moreover, the Examiner has not established that one of ordinary skill in the art would have any reason to use the claimed composition in any other field. In fact, all three of the cited references of Tanaka ('268), Tanaka ('126) and Anzures relate to the fields of semiconductors. Moreover, regardless of how the claimed composition is used, these references still teach that the presence of a metal ion is undesirable and should be avoided. Accordingly, one of ordinary skill in the art, upon reviewing Sato et al. or either of the Tanaka references would certainly not include a metal compound in the developer composition of Anzures et al. Accordingly, no proper *prima facie* showing of obviousness can be sustained on the basis of these references.

The Specification Discloses Unexpected Results

At page 7, section VI of the Office Action, the Examiner states that the unexpected results discussed in Applicants' previous response were given little weight since they are allegedly not commensurate in scope with the present claims. Since Applicants are relying on the showings in Examples 4, 9, and 10 as compared to Comparative Example 1, the Examiner alleges that the ingredients and their amounts recited in these Examples should be recited in the claims (e.g., 2.38% TMAH, 3,000 ppm of anionic surfactant, etc.), and suggests comparative experiments which would support the presently claimed compositions and methods.

The relative dissolution time of the claimed alkali metal-containing surfactants in examples 4, 9 and 10 of the present specification is lower than the corresponding ammonium-based surfactant in Comparative Example 1, meaning that the dissolution rate (developing sensitivity) is unexpectedly significantly improved when a metal containing anionic surfactant is used, compared to the dissolution rate obtained when a non-metallic (ammonium) anionic surfactant is used. Thus, the advantage of using an alkali metal containing-surfactant compared to an ammonium-based surfactant is evident.

It should be noted that Applicants' previous comparison of Examples 4, 9, 10 and Comparative Example 1 of the present application is only illustrative, not limiting. In fact, Examples 1-15 of the present application use various types of anionic, metal-containing surfactants containing different metal ions in various amounts (1,000-50,000 ppm) (see page 15, Table 1). The present invention resides in a combination of an organic quaternary ammonium base with particular anionic surfactants which results in an excellent dissolution rate. Because the type and amount of the organic quaternary ammonium base can be appropriately selected by those skilled in the art, it is not necessary for Applicants to use various organic quaternary ammonium bases in various amounts in order to compare the claimed alkali metal-containing surfactants with the corresponding ammonium-based surfactant. Therefore, limiting the type and amount of the organic quaternary ammonium base would unduly narrow the scope of the invention. Thus, the unexpected results presented in the specification are clearly commensurate in scope with the claimed invention.

These unexpected results strongly support the nonobviousness of the present invention, and would rebut a *prima facie* showing of obviousness even were such a showing present.

Ammonium Salts of Alkyl Diphenyl Ether Sulfonic Acid

Applicants wish to clarify the record with regard to the possible presence of ammonium salts of alkyl diphenyl ether sulfonic acid in the claimed composition. The Examiner's comments leave some confusion with regard to this point. In particular, in item II of the Office Action, the Examiner indicated that "Applicants state that the applied secondary reference with respect Sato et al. for the use of (1) an organic quaternary ammonium and (2) an ammonium salt of alkyl diphenyl ether sulfonic acid. The record shows that there has been no suggestion of an ammonium salt of an ammonium salt of alkyl diphenyl ether sulfonic acid is suggested from the applied secondary reference with respect to Sato et al." However, in item I of the Office Action, the Examiner clearly states that "Applicants urge that Sato et al. developing composition contain an ammonium salt of alkyl diphenyl ether sulfonic acid is correct". Therefore, the Examiner's assertions in item II of the Office Action seem to contradict his assertions in item I of the Office Action.

At page 4 of the Office Action, the Examiner stated that "Applicants urge that Sato et al. developing composition contain an ammonium salt of alkyl diphenyl ether sulfonic acid is correct. Applicants further urge that the instantly claims exclude an ammonium salt of alkyl diphenyl ether sulfonic acid. It is not found to be convincing. The language 'comprising' in the claims is open to include an additional chemical ingredient." However, Applicants never stated that the present claims exclude ammonium salts of alkyl diphenyl ether sulfonic acid. The Applicants merely

explained that it is not obvious for a skilled person in the art to replace the ammonium salt of alkyl diphenyl ether sulfonic acid taught in Sato by the metal salt of alkyl diphenyl ether sulfonic acid taught in Anzures.

Conclusion

No proper *prima facie* showing of obviousness can be set forth by the combination of Sato (or either/both Tanaka et al. reference(s)) and Anzures because one of ordinary skill in the art would not be motivated to combine the teachings of these references in view of Sato's express teachings that metallic components have adverse effects. Moreover, in light of these teachings of Sato, one of ordinary skill in the art could not have reasonably expected successful results from combination of these two references. Thus, no *prima facie* showing of obviousness can be sustained on the basis of these two references. Furthermore, even if a proper *prima facie* showing of obviousness had been set forth, such a showing would be effectively rebutted by the unexpected results reported in Applicants' specification.

In view of the foregoing, Applicants respectfully request reconsideration and withdrawal of the present rejection under 35 U.S.C. 103(a). Accordingly, Applicants respectfully request that the present application be allowed and passed to issue.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: 3/25/08

By: _____

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